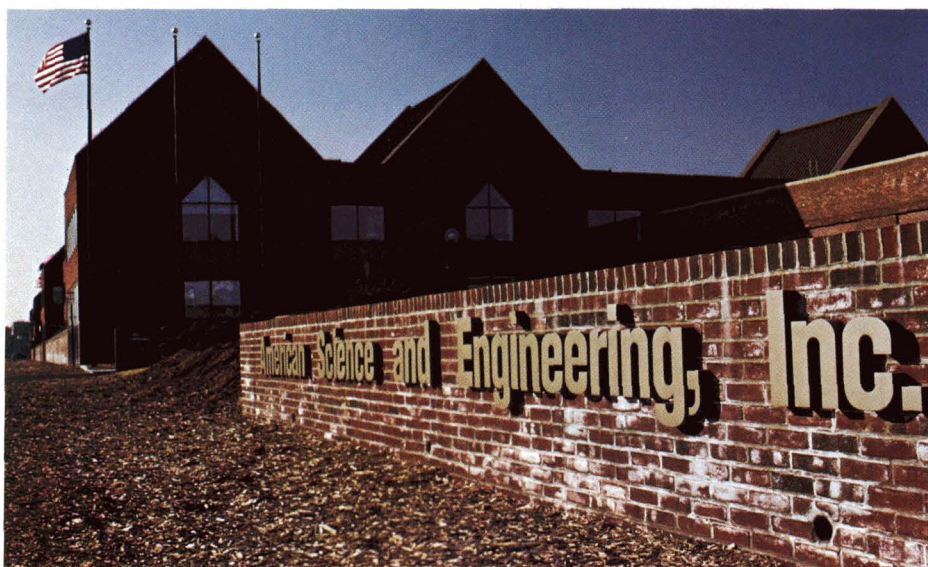


# SPINOFF FROM SPACE ASTRONOMY

A line of sophisticated X-ray systems accents the scope and value of aerospace technology transfer



In 1895, Germany's Dr. Wilhelm Conrad Roentgen discovered what he called x-rays, a form of radiation that could pass through solid matter and provide a photographic image of the solid's interior. Before the turn of the century, manufacturers were producing systems to generate x-rays and physicians were using them, initially to set broken bones. Over the years, x-ray use expanded to scores of applications in medicine, dentistry and biology, and in such commercial functions as examining manufactured products to insure quality, inspecting gems to detect flaws, or scrutinizing paintings to establish authenticity. But while there was enormous growth in the body of knowledge about terrestrial x-radiation, virtually nothing was known in the first half of the 20th century about cosmic x-rays. Some suspected their existence but—as was later learned—x-rays from stars and galaxies are absorbed by Earth's atmosphere, hence are not detectable on Earth's surface.

*Producer of space-spawned commercial x-ray systems, American Science and Engineering, Inc. (AS&E) occupies this headquarters and manufacturing facility in Cambridge, Massachusetts adjacent to the site of American Revolution citadel Fort Washington.*

After World War II, scientific rockets capable of climbing above the atmosphere confirmed that the Sun emits x-rays, arousing curiosity as to whether other stars did, too. In 1962, an Air Force-sponsored sounding rocket found an x-ray source in the Constellation Scorpio; that marked the genesis of x-ray astronomy.

NASA became the primary proponent of this new field. In 1967, Goddard Space Flight Center flew an x-ray telescope aboard OSO-4, the fourth Orbiting Solar Observatory, and performed the first long-term study of x-ray emissions from the Sun's corona. Goddard also sponsored development of the first satellite devoted entirely to



*One of several spinoff products is AS&E's Model 100 x-ray inspection system for examining baggage at airports and other high-volume security areas. Called MICRO-DOSE, the system features exceptionally low radiation exposure—100 times less than the standard set by the Federal Aviation Administration.*

study of cosmic x-ray sources; called the Small Astronomy Satellite (SAS-1), it was launched in December 1970.

The data returned by SAS-1 completely changed man's view of the universe. The satellite's x-ray telescope—not a telescope in the conventional sense but an array of radiation detectors—found 161 x-ray sources, many of them in areas where there was nothing visible to optical telescopes; this indicated the presence of a new class of non-luminous objects in space whose existence had not been anticipated. SAS-1 discovered the first black hole, x-ray emissions from galaxies, and pulsars emitting x-rays in evenly timed sequences.